ID de Contribution: **10** Type: **Non spécifié**

Neutron-induced light-ion production experiments with Medley at GANIL-NFS

mercredi 17 janvier 2024 17:10 (25 minutes)

New and reliable data for neutron-induced light-ion production (p, d, t, ^{3}He, and α) is essential to improve theoretical models and enhance our understanding of nuclear-reaction mechanisms. It has significant consequences on developing future technologies and on several applications, such as for single-event effects in electronics, neutron dosimetry, and fusion energy development. In this last topic, for example, the neutron irradiation of structural materials leads to the formation of isotopes of H and He, producing gas bubbles that affect their mechanical properties, mainly by producing embrittlement. In order to make reliable predictions on this damage, accurate experimental data on these nuclear reactions are required.

Despite their importance, these kinds of measurements are still scarce, especially above 14 MeV neutron energy. Therefore, reaction codes such as TALYS, and evaluated nuclear data libraries will benefit from newer experimental data.

The Medley setup, now installed in the Neutrons For Science (NFS) facility at GANIL, consists of a set of eight telescopes, each of them including two silicon detectors and one CsI. It is designed to detect and identify light-ions using the ΔE-ΔE-E technique so that it is capable of measuring double-differential cross-sections of light-ion production. As it will be shown in this contribution, the setup has demonstrated to have enough energy resolution to distinguish between the different isotopes of H and of He (p, d, t, ^{3}He, and α). Moreover, the time resolution is enough to provide data as a function of neutron energy, measured using the time of flight technique, in the whole energy range of the NFS facility, that extends between 2 MeV to 40 MeV,

In this workshop, the first preliminary experimental results for the last campaigns of 2022 and 2023,funded by ARIEL will be presented. These results comprise measurements for ^{nat}C, ^{nat}Cr, and ^{nat}Fe targets in the neutron energy range previously mentioned.

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Classification de Session: Session 2